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TECHNICAL MEMORANDUM
Utah Coal Regulatory Program

January 12, 2011

TO: Internal File

THRU: Joe Helfrich, Team Lead 1/31/11

FROM: April A. Abate, Environmental Scientist II 1-27-2011

RE: Kinney #2 Permit Application, Carbon Resources LLC, Kinney #2, C0070047
Task #3646

SUMMARY:

The hydrology section of the permit application for the Kinney #2 mine was reviewed for technical adequacy of the R645.301.700 regulations of the Utah Coal Rules.

Several deficiencies were identified are summarized herein.

TECHNICAL ANALYSIS:

GENERAL REQUIREMENTS:

The General Contents section of Chapter 7 Hydrology provides an introduction to the hydrology and geologic resources and potential impacts of mining as per R645-711.100 and 200.

The application describes hydrologic resources under Section R645-301-710 on page 7-1. This section describes the baseline data collected for the Kinney #2 project to date. Regulatory sections 301-711 thru 301-720 (with the exception of Certification requirements addressed in 301-712) were not referenced in the application. Even if this information is presented in other parts of the application, these regulations need to be referenced in chronological order.

Findings:

[R645-301-711 THRU 720]: This section does not address the regulations that detail methods and calculations utilized to comply with hydrologic design criteria, the hydrologic performance standards, and an explanation or a reference to reclamation activities. These requirements are found in R645-301-711.300, 400, 500 and need to be addressed in this section. These requirements can either be addressed in this section or referenced in this section to where they are addressed elsewhere in the MRP.

The Table of Contents in Chapter 7 reference incorrect page numbers for some sections of the Chapter. Please make corrections to the TOC for Chapter 7.

CERTIFICATION REQUIREMENTS

All hydrology-related maps are required to be certified and stamped by either a Utah-licensed professional engineer or geologist. Map 13 – Surface Facilities was submitted as stamped by a Utah licensed land surveyor and therefore complies with R645-722.500.

Findings:

The following maps will require a stamped certification by a Utah-licensed professional engineer or geologist: Map 7 – Regional Hydrology; Cross sections 7A and 7B; Map 8 – Works, Wells, springs, Faults; Map 9 – Groundwater Level Data.

Sampling and Analysis

The application states that all water quality sampling and analysis will be conducted in accordance with the provisions outlined in R645-301-723 (page 7-7 of the application). Table 6 summarizes the baseline water monitoring stations. Table 7 of the application outlines the operational water monitoring protocol proposed for the Kinney #2 permit and adjacent area and a table of water quality parameters listed in Table 20. The minimum parameters outlined in R645-731.211 were listed in the proposed water monitoring plan. The application depicts all proposed surface and groundwater monitoring locations on Map 28.

The application states that the water monitoring plan is designed to identify any possible concerns with respect to the surface and groundwater in order to protect the hydrologic balance. Furthermore, the water quality data will be used for the purpose of periodically review in order to determine if any trends arise. The monitoring program will submit samples on a quarterly basis up through the completion of reclamation activities.

The operational water monitoring plan outlined on Table 7 indicates that the monitoring well network consisting of 10 wells will be gauged for water level only in 8 of the 10 wells. The wells drilled within the permit boundaries have been demonstrated to be dry. However, CR will continue to monitor these wells for any changes as the operation progresses. In the event that water is encountered in these wells, then water quality parameters should be collected. Therefore, Table 7 should be updated to indicate that these wells will be sampled for water quality parameters in the event that water is encountered; gauging alone does not provide an adequate amount of data.

Several of the groundwater and surface water sample locations identified in Table 10 did not report data for total iron and manganese. These parameters are listed as minimum requirements in the rules. The laboratory reports attached to the application indicate that iron and manganese were sampled; however the results did not get translated to Table 10. Please make the necessary corrections to Table 10 by providing the total iron and manganese results.

The ephemeral drainages within the permit area include: Kinney Draw, Columbine Draw and Jones Draw. None of these drainages were proposed for monitoring in the operational water monitoring plan likely because there has been no evidence of any ephemeral flow since the baseline monitoring period began. However, since these drainages are located within the permit area, they should still be monitored for flow and water quality parameters if water is present and therefore included in the operational water monitoring plan.

Springs within the Long Canyon area will be considered part of the Cumulative Impact Area and will also require monitoring when/if the mind expands further eastward. Therefore, the water monitoring program should be expanded to include important springs in Long Canyon for operational parameters to determine if these springs exhibit seasonal variability that would

indicate that they are susceptible to recharge, or if they represent a confined perched system that discharges on a continuous basis.

Findings:

[R645.724.100 and .200]: The groundwater and surface water operational sampling plan should be expanded to include additional sampling locations. *All* groundwater monitoring wells should be sampled for water quality parameters. Currently the applicant is stating that they will only be monitored for water level data. The Division recognizes that most of these wells are dry; however, in the event that water is present in the wells during a given quarter, the water should then be sampled for the required operational parameters to help gain a better understanding of the water quality data in the wells when and if it becomes available.

Table 7 should be updated to include water quality parameter sampling for all groundwater monitoring wells in the monitoring well network and ephemeral drainages within the permit area. Table 10 showing the analytical parameter data for the Aspen, Eagle, and Sulfur springs and surface water samples Miller Outlet, Mud Creek, Res -1, and Angle Spring needs to be corrected to show the data for total iron and total manganese in the samples.

The ephemeral drainages within the permit area include: Kinney Draw, Columbine Draw and Jones Draw. None of these drainages were proposed for monitoring in the operational water monitoring plan likely because there has been no evidence of any ephemeral flow since the baseline monitoring period began. However, since these drainages are located within the permit area, they should still be monitored for flow and water quality parameters if water is present. The Division recommends that the operational water monitoring plan be expanded to include quarterly monitoring of the ephemeral drainages within the permit area.

Springs within the Long Canyon area will be considered part of the Cumulative Impact Area and will also require monitoring when/if the mind expands further eastward. Therefore, the applicant should identify the critical springs within Long Canyon and add them to the water monitoring plan for operational parameters. Additional characterization of the springs in Long Canyon is needed to determine if these springs exhibit seasonal variability that would indicate that they are susceptible to recharge, or if they represent a confined perched system that discharges on a continuous basis.

Baseline Information

The applicant defines the baseline cumulative impact area as the area where potential hydrologic impacts that could result from proposed mining activities in combination with other unrelated mining activities that may contribute to cumulative impacts in the area. The applicant delineated the boundaries of any baseline cumulative impact area as the permit area and any upgradient area which could be impacted by mining-related drawdown of the groundwater and

any downgradient areas which could be impacted by mining-related changes in the groundwater flow volumes or water quality. These areas were limited to Mud Creek to the west, Miller Canyon to the north, Long Canyon to the east and the headwaters of UP Canyon on the south.

During the drilling exploration phase of the Kinney #2 project, groundwater above the coal seam was only found in limited, localized areas. Geologic data indicate that the Hiawatha coal seam to be mined dips to the north. Groundwater encountered in the monitoring wells indicates that there are very minimal elevation changes in individual wells, which infers that there is no seasonal influence. Based on these data from the monitoring wells, it does not appear that groundwater at these depths is heavily influenced by recharge from the surface. Therefore it is plausible that the groundwater encountered in monitoring wells is from perched confined systems within the Blackhawk formation.

Currently, the only wells that are slated for water quality parameter testing are CR-10-11 and CR-10-12. These wells are located west of the permit boundary and set within the alluvial sediments in Pleasant Valley adjacent to Highway 96. The only other wells to yield any groundwater were CR-06-03 and CR-06-09. CR-06-03 was originally located in the Eagle Canyon graben and yielded groundwater. Unfortunately, this well has been decommissioned making any additional characterization of groundwater conditions in the Eagle Canyon graben impossible to assess. The only other well that provided baseline water quality data was CR-06-09. This well has had some of its own logistical challenges in collecting water samples. Data from CR-06-09 would provide an assessment of conditions east of the permit boundary; however the Hiawatha seam is approximately 50 feet higher in elevation at this location and is separated by the Eagle Canyon graben which truncates the Hiawatha seam and drops it down several hundred feet providing a hydrologic barrier for water movement to flow (refer to Cross Section 7A). As a result of this barrier, it is not very likely that groundwater conditions in this well will be representative of those (if any) in the permit area.

As previously mentioned, monitoring well CR-06-03-ABV was located within the Eagle Canyon and produced six months worth of water quality data in 2006 prior to this well being plugged. This well was advanced in Eagle Canyon, a narrow graben approximately 500 feet wide with faults on either side of it. In this graben, the Hiawatha seam has been dropped down and is located approximately 150 feet lower than the corresponding Hiawatha seam in the permit area. Given that water was encountered in well CR-06-03-ABV at an elevation of 7,798 and not encountered at this same elevation in well CR-06-05A, the question is then raised whether or not groundwater is being actively transmitted along the fault system in Eagle Canyon? There is further evidence that a significant amount of groundwater may be transmitting along the fault systems in the area as seen by the amount of year-round flow discharging from Sulfur Spring located 1,300 feet northwest of the permit boundary.

In Section R645-301-624.310, the applicant discusses the nature of the groundwater in Eagle Canyon graben as originating from rain water and snowmelt percolating into the fault

gouge zone and migrating into the brecciaed zone of the fault system suggesting that a piezometric surface of groundwater exists in this fault zone. In Long Canyon further to the east, numerous springs have demonstrated springs flowing along the order of 10 to 20 gallons per minute (gpm). Sulfur Spring located to the north/northwest of the permit boundary and at the east boundary of the Pleasant Valley graben averages a year-round discharge of 80 gallons per minute. Clearly, there is an active groundwater system in the area. However, it is difficult to discern if it is coming from a series of perched zones or if it is readily being transmitted in a south-north direction through faults in the area. Based on the data collected from springs and the groundwater monitoring wells, there is evidence that it could be coming from both.

A groundwater monitoring well installed in the Eagle Canyon graben has the highest likelihood of producing water. If the fault is acting as a conduit to the flow of groundwater, being that it is situated immediately adjacent to where mining activities are to take place, it should provide a good characterization of any potential impacts to groundwater from mining activities since the water table in the graben has been shown to be above the Hiawatha seam where mining is to occur. Strictly making an assessment based off the Map 7A, which shows a west to east cross section of the proposed Kinney #2 mine, it is not clear how far eastward mining of the Hiawatha seam is to extend within the permit boundary (?). Judging by the current map, it is implied that mining will occur right up to the Eagle Canyon Graben. If this is the case, then impacts to groundwater in Eagle Canyon are possible and therefore, the Division recommends that a new well be drilled within the Eagle Canyon graben within the permit boundary to assess groundwater conditions.

According to Map 7 – Regional Hydrology, a total of three monitoring wells were drilled within the permit boundary: CR-06-01, CR-06-02 ABV/CR-06-02, and CR-06-05A with CR-06-03-ABV drilled on the northeast *corner* of the permit boundary line. Of these wells, only CR-06-03-ABV produced six months worth of water quality data in 2006 prior to this well being plugged due to access issues with the property owner. All other wells within the permit boundary area were reported to be dry. Additional wells in the adjacent area include: CR-06-09/CR-06-09-BLW/CR06-09-ABV, a topographically upgradient well, and two topographically downgradient wells: CR-10-11 and CR-10-12 located near Highway 96. Of the adjacent area wells, upgradient well CR-06-09 has produced water level data only and downgradient wells CR-10-11 and CR-10-12 drilled in 2010 have produced water level and water quality data. It should be noted that the ABV and BLW nomenclature denotes the location of a water sample attempted above or below the Hiawatha coal seam.

Baseline data from monitoring well CR-06-09/ABV/BLW were limited to depth to water only. Baseline water quality parameters for this well have not been collected due to limitations in collecting water samples from this well. This well is located further to the west and in an area considered geologically separate from the coal seam to be mined. Therefore, it has been determined that the water quality and quantity data that this well would yield, does not directly effect the current mine plan operation. However, it is recommended that should the mine plan to

expand their operation further eastward, redeveloping this well for the collection of water quality parameters is recommended in enough time to establish seasonal variation prior to mine expansion into this area.

Baseline sampling of springs and seeps in and adjacent to the permit area included: Angle Spring, Aspen Spring, and Eagle Spring. Baseline monitoring data collection dates from these springs is reported on Table 6. Analytical data tables for each of the springs are located in Exhibit 10 in the MRP. All of these springs, with the exception of Angle Spring are proposed for operational water monitoring.

Aspen Spring is identified as being within the permit boundary. Angle Spring is located north of the permit boundary. Baseline data from Angle spring was collected beginning in 2005 and ceased in September 2006 due to an access issue. There were several other springs that were identified as being within the permit boundary: Eagle Springs 1, Eagle Springs 1A, Eagle Spring 2, Eagle Spring 3. The applicant has not reported any data on these springs.

Eagle Spring (aka Miller Spring) located over one mile north of the permit boundary has been monitored on a regular basis but does not appear to flow very often. Sulfur Spring located approximately 1,000 feet north of the permit boundary flow year-round at an average rate of 80 gpm. Sulfur Springs discharges near/at the Columbine coal seam and also along the Pleasant Valley fault line, which is located at a lower elevation than the Hiawatha seam. Data indicate that Sulfur Spring has very different water chemistry than the other nearby springs. When comparing Sulfur Springs to the other springs evaluated, the differing water chemistry and its discharge outfall location may be factors to indicate that the groundwater originating from Sulfur Spring may likely represent a different groundwater origin.

Baseline water sampling of the springs indicated that there is a trend of oil and grease detections in the samples. On average, oil and grease were detected on the order of 5 mg/L in the springs. The exception to this was Sulfur Spring, which had a maximum 540 mg/L detection and averaged 21 mg/L. Table 10 units were not specified; it is assumed that all results are in mg/L. The other surface water samples displayed high concentrations of oil and grease Miller Outlet, Mud Creek, and Res-1 had the respective concentrations of 460 mg/L, 360 mg/L, and 340 mg/L. There was no explanation for the oil and grease detections given in the MRP.

Surface water locations that were part of the baseline water monitoring program included: Miller Outlet, Mud Creek, Res-1. All of these locations are outside the permit area and are proposed for operational water monitoring. Baseline data were collected from each of these surface water locations on a regular basis.

Findings:

R645-301.724.100: Baseline data requirements have not been met for groundwater monitoring wells CR-10-11 and CR-10-12. The Division understands that quarterly sampling at these wells is ongoing; however in order to meet the baseline data requirements to demonstrate seasonal variability, an addition round of data collection up through the summer of 2011 is required.

As a result of CR-06-03-ABV being decommissioned, only six month worth of baseline data were collected from this well. If extraction of the Hiawatha seam is expected to make its way eastward right up to fault that delineates the western side of the Eagle Canyon graben, then the permittee must provide a commitment to install a replacement well in order to measure any possible negative effects that adjacent mining would have on the groundwater found within Eagle Canyon Graben. However, if mining is not anticipated to directly abut that fault line, the extent of mining should be noted on the cross section so that it is clear that there adequate distance separating extraction of the Hiawatha seam from the groundwater within Eagle Canyon.

Baseline data from monitoring well CR-06-09/ABV/BLW were limited to depth to water only. Baseline water quality parameters for this well have not been collected due to limitations in collecting water samples from this well. This well is located further to the west and in an area considered geologically separate from the coal seam to be mined. Therefore, it has been determined that the water quality and quantity data that this well would yield, does not directly effect the current mine plan operation. However, it is recommended that should the mine plan to expand their operation further eastward, redeveloping CR-06-09/ABV/BLW for the collection of water quality parameters is recommended in enough time to establish seasonal variation prior to mine expansion into this area.

Documentation of the no flow data is still required to be presented in the plan showing the dates of monitoring for Eagle Springs 1, Eagle Springs 1A, Eagle Spring 2, Eagle Spring 3. Currently, these springs are listed in Table 9 but only presents the data as estimated flows. A tabulated data set for ALL springs monitored is recommended in order to demonstrate the seasonal fluctuations when and/if present. Furthermore, because Eagle Springs 1, Eagle Springs 1A, Eagle Spring 2, Eagle Spring 3 are located within the permit boundary, they should be added to the operational water monitoring plan.

Monitoring of Aspen Spring began in June 2008 and then resumed in June 2010. The data presented indicates that flow was "not measured or at a trickle". Several dates on the analytical data table were listed but no information was given. Field parameter data were given despite flow measurements not being recorded. How can field parameter data be collected if no water is flowing? If dates are given with no information, the table should note that the spring was monitored but not flowing. Please clarify this information and update the analytical tables accordingly. It is important to note that even if a sample location is dry and not flowing, it is still

imperative that it be recorded as data collected. For example, Eagle Spring has been monitored consistently since 2005 yet according to Table 6, it appears that data collection is sporadic because only dates when water quality data were available are shown. Table 6 should be corrected such that it accurately reflects data collection even in instances where there was "No Flow" observed.

Angle Spring is located approximately 300 feet topographically below the mine permit area and in a downgradient location to any groundwater flow from perched aquifer systems, or any recharge areas within the permit boundary. As such, this spring would be an important point to monitor. The Division asks that every effort to regain access to this sampling point be pursued.

Eagle Spring flow data ranged from Dry to <10 gpm. Normally, any value over 1 gpm is significant and would best be presented as a value, rather than <10 gpm. Eagle Spring has been monitored since May 2005 up to the present time. Baseline data collection requirements for this spring appear to be met. However, the footnote at the bottom of the table in Appendix 10 is an incomplete sentence and needs to be corrected.

GEOLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR 784.22; R645-301-623, -301-724.

Analysis:

Geologic resources as they pertain to hydrologic consequences are discussed in Section 624.310 of the application.

Findings:

The geologic information listed in section 624 is discussed in sufficient detail and meets the Utah coal rules for sufficient geologic information given in accordance with R645.

RECLAMATION AND PREVENTION OF MATERIAL DAMAGE

The applicant states the regulation mostly verbatim without any supporting narrative.

Findings:

[R645-301.724.320]: The applicant states the regulation mostly verbatim without any supporting narrative. Additional explanation or references to how reclamation will be

accomplished to prevent material damage to the hydrologic balance is needed to meet the requirements of this section.

CLIMATOLOGICAL RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.18; R645-301-724.400

Analysis:

The applicant provided a discussion on page 7-24 of climatological information. This information included a discussion on climate factors and seasonal variability data that are representative of the proposed permit area. Information on seasonal temperature and precipitation rates were included as well as wind data were illustrated on Tables 13, 14, 15, respectively.

Findings:

The information provided meets the R645-301-724.400 coal rules.

ALLUVIAL VALLEY FLOORS

Regulatory Reference: 30 CFR 785.19; 30 CFR 822; R645-302-320.

Analysis:

Alluvial Valley Floor Determination

The applicant is not planning to conduct any ***surface*** coal mining activities; however, the regulation does state that if the applicant intends to conduct mining in a location adjacent to a stream, the applicant shall either affirmatively demonstrate the presence of an AVF, or submit the results of a field investigation as per R645-302.321.100. The AVF is discussed in Chapter 9 of the application and a map of its extent is found on Map 32.

The applicant performed a series of field studies consisting of aerial photo and topographic map reviews, soils surveys, geomorphic characteristic evaluations and field visits. Based on this information, the applicant did affirm that Pleasant Valley did meet the definition of an AVF from R645-100-200 based on the presence of:

Unconsolidated stream-laid deposits holding streams with water availability sufficient for subirrigation or flood irrigation agricultural activities.

As per R645-302.321.100, the Division is required to make an evaluation regarding the existence of the probable AVF in the proposed permit or adjacent area and to determine which areas, if any require additional studies in order for the Division to make a final determination on the existence of an AVF. In this case, this regulation applies to the adjacent area to the west, which would include Mud Creek and the Scofield Reservoir.

The applicant states that underground mining operations are located upgradient of the Pleasant Valley AVF and that there is a possible zone of influence within the underground workings that could possibly contribute groundwater to the AVF. However, as the applicant demonstrated in the PHC, mining is to take place in an area within the permit boundary that has been found to lack groundwater. While there is some indications that a regional water table may exist and may be hydrologically connected to the aquifer system in Pleasant Valley (although there is no data to validate that that is the case) at further depths within the permit area, the elevation where mining of the Hiawatha seam is to take place will be located at an elevation well above that. Moreover, surface water flows that could flow in the direction of the AVF will be managed by the sediment control plans and methods that the applicant has committed to in Chapter 7 of the application. As a result, any surface water discharges to the AVF where water quality effluent limitations could potentially be exceeded will be managed by the Kinney #2 UPDES permit.

According to the Office of Surface Mining (OSM) draft guidance document on AVF Study Guidelines, 1983, Section 510 (b) (5) must affirmatively demonstrate that the proposed mining operation will not interrupt, discontinue, or preclude farming on AVF (with two exceptions) and that the proposed operation will not materially damage the water supply of those AVFs not excepted. Section 515 b 10 F requires preservation of the hydrologic functions of all AVF outside the mine area.

According to Carbon County zoning maps, Pleasant Valley directly west of the permit boundary is zoned for Agricultural use. The applicant has also indicated that irrigation water supplied to the AVF originates in areas further upgradient from the permit boundary (to the east) and also from Mud Creek. The applicant has identified one irrigation ditch that bisects the southwest corner of the permit boundary but mentions that it appears to not have been in use for a long period of time judging by it not appearing to be maintained. Nevertheless, the applicant has indicated that the ditch will be culverted and protected from surface water runoff in the disturbed area of the permit boundary. The applicant further demonstrates that mining and reclamation have historically been conducted in this area without any effects on the hydrologic balance of the AVF. Based on Total Maximum Daily Load (TMDL) studies of the Scofield Reservoir have indicated that the water body is impaired for total phosphorus and dissolved oxygen. A USGS professional paper – Water Resources Investigation Report 96-4020 attempted to evaluate the effects of coal mining and road construction on the Scofield Reservoir. The report concluded that the reservoir during its record high flow water year in 1983-1984

transported significant amounts of sediments and trace metals (that could originate from coal mining activities were not significant enough to constitute a hazard to the reservoir and impair its designated uses. This study supports the assertion that coal mining activities have negligible effects on the water quality of the Pleasant Valley AVF.

Findings:

The Division concurs with the applicant in that impacts to the AVF identified in Pleasant Valley will not be impacted by the Kinney #2 mining operation.

BASELINE CUMULATIVE IMPACT AREA INFORMATION

Regulatory Reference: R645-301-725

Analysis:

Groundwater Resources

The applicant identified 4 aquifer systems in the permit/adjacent area:

1. Alluvial/Colluvial aquifer that is associated with surface drainages and primarily identified with the floodplain area in and around Mud Creek.
2. Perched/Isolated aquifer system that is primarily contained within sandstone lenses of the Blackhawk formation.
3. Stored mine water from previous abandoned mine workings
4. Regional groundwater aquifer that is found within the lower Blackhawk and uppermost Starpoint Sandstone.

The alluvial/colluvial aquifer is formed primarily from the surficial sediments deposited in Pleasant Valley. This is considered a shallow aquifer that is readily recharged from surface precipitation and snowmelt that feeds Mud Creek as well as some side channel tributaries.

Perched systems are found throughout the Book Cliffs and Wasatch Plateau areas. These aquifers tend to experience only nominal recharge from the surface and are commonly found during mining activity in the region. These systems tend to be limited in their volume and aerial in extent. In the Kinney #2 permit and adjacent area, faulting also plays a role in observing discharges from springs. Springs found within the permit boundary are believed to be fault controlled and only discharge for a limited time during early spring and drying up by mid-summer indicating they are responding directly to seasonal snowmelt and precipitation.

The application states that there is a possible source of groundwater within the underground reservoirs of stored mine water from abandoned mine workings. These historical workings are from coal extracted from seams that were lower than the Hiawatha seam. The applicant states that the total volume of groundwater storage from the abandoned workings is unknown and is not anticipated to affect proposed operations because this system is below the anticipated active workings. The applicant states that they are unaware of any mine water discharges that are a direct result of the accumulation of groundwater from old workings.

According to geological studies that were done on a regional scale and from other mining operations further west of Pleasant Valley, a regional groundwater system has been identified in the lower portions of the Blackhawk formation and the uppermost portions of the Starpoint sandstone (USGS Prof. Paper No. 2246, Waddell et al. 1983 and Mud Creek and Upper Huntington Cumulative Hydrologic Impact Report, DOGM, July 2010). The coal-bearing seams are found in the lower portions of the Blackhawk formation which may be located near the interface of this regional aquifer. The coal seams in the Blackhawk have typically been reported as saturated by this regional aquifer. However, exploration drilling in the permit and adjacent area has indicated that limited groundwater has been detected above or in the coal seam and no groundwater was detected within the boundaries of the permit area. The region is heavily faulted by a series of North-South-trending faults creating horst and graben topography in the region. The presence or lack of a regional groundwater system is believed to be influenced by this fault-block topography in the area.

The permit application discusses the presence of limited groundwater found above and below the Hiawatha coal seam. It is not well documented in the permit application to what extent the groundwater detected originates from a regional aquifer, or if the water source is mainly from the perched systems. Based on the cross-sections 7A and 7B provided in the application, the regional aquifer was supposedly encountered in some instances, and in others, the wells were advanced just short of encountering the elevation where the regional aquifer was predicted. The application states that points along the perennial stream in Miller Canyon along with Mud Creek and Scofield reservoir were considered as projection points in developing a model of a regional aquifer. However, as previously mentioned, the regional aquifer that has been studied by other researchers in the area is contained within the lower Blackhawk and Upper Starpoint. It would appear difficult to believe that there is a surface expression of this aquifer that contributes to base flow along the perennial reach of Miller Canyon. The logical sources of groundwater that could contribute to perennial flow would be groundwater from springs (which are likely associated with perched lenses) and seasonal precipitation that produces runoff. Furthermore, using Mud Creek and Scofield Reservoir as downgraident project points of this regional aquifer does not seem to fit since these water bodies are mainly fed by groundwater from alluvial sources, runoff and flow contributions from tributaries. The application uses a model and a series of projected points to extrapolate a regional aquifer in the permit area and associated downgradient areas. It is suggested that the idea of whether or not there is substantial evidence to confirm the presence of a regional aquifer be reevaluated.

Groundwater occurrence and movement are believed to be structurally controlled. The interbedded layers of sandstone and shale horizons within the Blackhawk are believed to limit the movement of groundwater within the region. Groundwater flow direction in and adjacent to the permit area cannot be determined based on the nature of the groundwater and the lack of groundwater data from the monitoring well network. It is possible that any groundwater that flows from the perched systems or from the faults flows in either a down dip direction toward the east or in a vertical direction. This suggests that the groundwater system is contained within isolated systems and is structurally controlled.

Springs and Seeps

A discussion on springs and seeps is found on page 7-18 of the permit application. Field data collected on select springs was presented on pages 7-39, 7-41, 7-43, 7-45. Data was based on information presented in Table 9, which presumably was collected during the 2006 Spring and Seep survey - initially done as part of baseline studies for the Kinney #2 project.

The springs located within the permit boundary are located within the Eagle Canyon drainage that bisects the permit area along its eastern edge. Each of the springs within Eagle Canyon (inside the permit boundary) average less than ½ gallon per minute discharge, if they discharge at all. The next canyon over located 1 ½ miles east is Long Canyon. In Long Canyon there are a multitude of springs. Interestingly, the springs in Long Canyon have significant discharge rates ranging from seeps to 20 gpm and averaging 10 gpm. Additional data collected from the springs discharging from Long Canyon was not provided as part of this application to indicate if these springs exhibit seasonal variability that would indicate that they are susceptible to recharge, or if they represent a confined perched system that discharges on a continuous basis. Several springs in Merrill Canyon approximately one mile further east of Long Canyon exhibited flows ranging from <1 to 10 gpm. Springs located in Jump Canyon approximately 2 miles to the east exhibited flow volumes ranging from <1 to 10 gpm.

Springs that are located north of the permit boundary include: Sulfur Spring, Miller (Eagle) Spring, Angle Spring. Sulfur spring discharges approximately 80 gpm year-round, while Eagle/Miller Spring only discharges 1 gpm and is often dry.

Perennial Streams

There are no perennial surface water resources in the permit area. Perennial surface water resources in the adjacent area include: Mud Creek southwest and approximately 1,500 feet topographically down slope of the permit area and Miller Canyon approximately 2 miles to the north/northeast. Perennial water resources are located on Map -7 Regional Hydrology. Mud Creek is the principal drainage that runs along the central axis of Pleasant Valley and drains into

the Scofield Reservoir. Miller Canyon is a small perennial water body that drains into Scofield Reservoir along its eastern flank.

The Price River originates along the eastern flank of the Scofield Reservoir and is a major river system in the region that runs southeast through most of Carbon and Emery Counties and ultimately joins the Green River. The Price River Watershed is listed with the Utah Department of Water Quality as an impaired watershed for total dissolved solids where TDS concentrations measured along various reaches of the Price River have exceeded the Utah water quality standard for TDS of 1,200 mg/L. However, in the upper reaches of the Price River watershed where the permit and adjacent area are located, TDS concentrations have historically been below the 1,200 mg/L standard. TDS measured as part of baseline parameter data collection for the Kinney permit application at the perennial stream sites: Miller Outlet, Mud Creek, and Res 1 have been demonstrated not having exceeded the state standard for TDS.

Ephemeral Streams

Ephemeral drainage resources exist within the permit boundary and include: Eagles Canyon, Kinney Draw, Columbine Draw and Jones Draw. These ephemeral drainages are shown on Figure 2, within Chapter 6 of the permit application. The applicant has reported that no water was present in any of the drainages during the baseline monitoring period.

Surface Water Bodies

Scofield Reservoir is a state park and a man-made water body located in the Pleasant Valley graben and approximately ¾ mile to the north of the Kinney #2 permit boundary. The Utah Division of Water Quality has classified the Scofield Reservoir as a 1C, 2B, 3A and 4 water bodies. The details for each of these classification codes are presented on page 7-35 of the permit application. In short, these classifications indicate that the reservoir and its associated tributaries are protective for treated culinary water use, recreation, cold water non-game fish habitat, irrigation and stock water uses.

Water quality in the Scofield Reservoir is considered fair. The water tends to have high concentrations of nitrogen and phosphorous and low concentrations of oxygen. Concentrations of total phosphorous and dissolved oxygen are two constituents have consistently exceeded the recommended pollution indicators from water samples collected from the reservoir. The reservoir has had historical problems with algal blooms that have been responsible for fish kills due to the depletion of oxygen in the water. None of these pollution indicators are associated with historical mining activities in the region. However, activities such as mining, road and other construction do have negative impacts on the water quality due to excessive sediment loading into the reservoir. These sedimentation issues emphasize the need for diligent sediment controls from the proposed mining operation.

Findings:

The applicant has provided a comprehensive study and discussion in sufficient detail of the hydrologic resources found within and adjacent to the permit area. The applicant has met the hydrologic resources requirements in accordance with R645-725.300.

Water Rights

Groundwater Rights

Groundwater rights are discussed on page 7-30, shown on Map 30 and listed on Table 11 of the permit application. There were no groundwater rights located within the permit boundary. Several groundwater water rights are located within the town of Scofield located approximately one-half mile west of the permit boundary. These water rights are associated mainly with private water wells. The applicant states that all wells are screened in valley alluvium located on the Pleasant Valley graben, which is a fault block that has been dislocated stratigraphically from the rock units to the east. There is approximately 223 feet of offset of the Hiawatha coal seam from the permit area to where these water wells are located. Moreover, the strata in the permit area dip to the northeast further prohibiting any groundwater migration to the west that could potentially affect the water quality in these wells.

Two additional groundwater rights associated with water wells were located approximately two miles north of the permit boundary near Scofield Reservoir – Water Rights a28898 and E1934. These groundwater rights are located in Section 21 T12S R7E. Water right a28898 was not shown on Map 30 and Water Right E1934 is associated with 91-4891 and should be clearly marked. The wells reportedly serve for domestic and irrigation uses and are advanced to depths of 50 feet and 146 feet below ground surface (Div. Of Water Rights – Well Log information). A well log describing the geology was only available for a28898 and reported shale to depths of 80 feet. Sandstone was reported from 80-146 feet. Based on the geologic cross section Map 7B provided, the Hiawatha seam to be mined is truncated near the northern permit boundary at an approximate elevation of 7,790 feet. The locations of these wells are set off Highway 96 and adjacent to Scofield reservoir at an approximate elevation of 7618. The Pleasant Valley graben drops the Hiawatha seam at Sulfur Spring down to an approximate depth of 7400 feet. This indicates that these water wells are hydrologically disconnected from the Hiawatha coal seam and are highly unlikely to be affected by mining activities.

Findings:

R645-301.731.800: There appears to be no direct hydrologic connection to the groundwater water rights located in the Pleasant Valley and the water rights located north the

Scofield Reservoir. The Hiawatha seam in the permit area is located between 172 and 223 feet above these water rights and therefore, any impacts to them are unlikely.

Please make corrections to Map 30 showing the locations of Water Rights: a28898 and E1934.

Surface Water Rights

Surface water rights are discussed on page 7-53 and shown on Map 31 of the permit application. Table 12 on page 7-72 lists the surface water rights within a 4 mile radius of the permit boundary. The discussion on page 7-53 does not address any surface water rights found within the permit boundaries. According to Map 31, two exist: 91-3588 and 91-4026. Surface water right number 91-3588 is listed as a stockwater right located on a stream. Since there are no streams in the permit area, this water right information is questionable and requires further explanation. In addition, this water right is shown on the map with a "See Note 1" label on it. However, there is no reference to a note on the map. Surface water right 91-4026 appears to be a disputed water right on a spring used for stockwatering. These locations should be field checked by the Division and the Department of Water Rights to determine if they are being put to beneficial use (i.e. if a developed stockwatering trough is present).

There are other surface water rights found within the adjacent area. Several surface water rights are found along Mud Creek, which is hydrologically disconnected from the permit area. There are also a series of water rights located along Long Canyon and Miller Creek. There are several beaver ponds located in this canyon, which may likely be the sources of these surface water rights. The applicant does not address these water rights on page 7-53 of the application. In addition to the surface water rights in the permit area, these water rights in Long Canyon and along Miller Creek should be field checked by the Division and the Department of Water Rights in order to better establish baseline conditions.

Findings:

Surface water rights in the permit area and within Long Canyon and Miller Creek need to be field checked by the Division and the Department of Water Rights in order to better establish baseline conditions to determine if any of these water rights are being put to beneficial use (i.e. stockwatering troughs). The Division would like to perform this fieldwork weather permitting during the 2011 field season.

On Map 28 the surface water sample locations in Long Canyon and in Eagle Canyon that will be monitored as part of the water monitoring program should be updated on the map to show which of these samples have a water right attached to them.

Probable Hydrologic Consequences (PHC) Determination

PHC are discussed at length in section 645-301-728. The applicant provides a general discussion of baseline groundwater and surface water conditions in and adjacent to the permit area. In the permit area, groundwater in the area is limited to isolated perched groundwater pockets and springs and seeps primarily found along the margins of localized faults. Off the permit area, the primary beneficial use of groundwater is concentrated around the southeastern portion of Scofield Reservoir. This groundwater is from the shallow alluvial/colluvial system associated with the reservoir and is located west of and downgradient of the permit boundary. Hydrologically this aquifer system is considered isolated from the east-dipping fault block and graben system that makes up the strata to be mined. Furthermore, the Hiawatha seam truncates on the western side of the permit boundary approximately 223 feet above the level of the Scofield Reservoir isolating the coal seam from the alluvial aquifer system.

The applicant indicates that potential groundwater impacts include: prior underground mining activities that have historically taken place in the region and the draining of localized perched aquifers pockets which is a common occurrence in the Wasatch Plateau/Book Cliffs region from mining activities. These perched systems if drained could result in redirection and redistribution of groundwater flows. Springs and seeps within the permit area could be effected. CR plans to monitor springs and if any interruption of flows are noted causing a diminution of a water right, CR will remedy the loss by instituting water replacement activities including monetary compensation, or other appropriate mitigation measures. Underground workings after they have been mined out are expected to at least partially fill with water.

There is some evidence that faults play a role in both transmitting and inhibiting the flow of groundwater. The applicant makes the case that groundwater is limited by low transmissivities and limited recharge in the area due to the arid conditions and limited outcrop exposures. Given that the drilling investigation demonstrated that the location where the Hiawatha seam to be mined did not produce any groundwater in the area and the isolated nature of the perched systems, it is unlikely that mining operations will effect or disrupt any groundwater flows or impair the water quality of any receiving water bodies identified in the region.

Mining-induced subsidence is considered negligible as the mining methods to be employed are first mining only. No longwalls are planned which have a higher likelihood of producing subsidence effects on the surface. Therefore, springs in the permit area are at minimal risk for damage. Furthermore, springs in the permit area have only demonstrated minimal and sporadic flow and do not appear to be a significant source of water for any beneficial use.

Probable hydrologic consequences for surface water are expected to be negligible since there are no perennial surface water bodies within the permit area. The presence of surface water in the area is considered minimal. Eagle Canyon located within the permit area is the only canyon with an observed ephemeral flow. The applicant contends that the impacts to surface water drainages will likely be from surface water runoff, temporary increases from surface disturbance areas, increased levels of TDS and other constituents. All of these impacts are expected to be negligible due to the implementation of sediment controls.

Findings:

The applicant has provided a comprehensive study and discussion in sufficient detail of the PHC within and adjacent to the permit area. The applicant has met the hydrologic resources requirements in accordance with R645-301.725.300.

MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -301-731.

Analysis:

Water Rights Maps

The applicant has presented Maps 30 and 31 showing the groundwater and surface water rights, respectively within a 4 mile radius of the permit boundary.

Regional Hydrology Map

The Regional Hydrology Map is presented as Map 7 and shows all the groundwater wells, springs and water bodies in the region.

Cross-Section Maps

The regional geology and the location of the Hiawatha coal seam to be mined relative to the other coal seams in the area are depicted on cross section maps 7A and 7B. Map 7A represents a west - east map beginning near the Scofield Reservoir to the Jump Creek Graben. Map 7B depicts a north – south map beginning near Sulfur Spring and continuing to UP Canyon. These cross-section maps are represented in plan view on Map 7 – Regional Hydrology.

Surface and Groundwater Monitoring Sites Map

The Surface and Groundwater Monitoring Map depicts all the proposed operational sampling locations and is presented as Map 28 in the MRP.

Findings:

Maps 30 and 31: Several of the groundwater rights within the search radius are associated with change or exchange applications as noted with an Identification number starting with an A or a E before the number. When discussing water rights in the narrative, these A or E water rights are referred to but they are not shown on Map 30, so it is difficult to cross-reference. In addition to the water right number, please also reference the change or exchange water right numbers on the map for clarity.

Surface water right information needs to be expanded upon to address the surface water rights within the permit boundaries. The application needs to be updated to include updates to Map 31 explaining the "See Note 1" comment next to water right number 91-3588. Additional information about the status and nature of the two individual water rights is needed on page 7-53 of the application.

Map 7: There are several locations with "Eagle Spring" in the title on Map 7 – Regional Hydrology map: Eagle Spring 1, Eagle Spring 1A, Eagle Spring 2, Eagle Pond 2, and Eagle Seep 3. Furthermore, Table 9 on page 7-18 of the permit application lists Eagle Seep 1, Eagle Seep 1A, Eagle Spring 2, and Eagle Seep 3. Presumably, Eagle Seeps 1 and 1A correspond to Eagle Spring 1 and 1A on Map 7. This requires clarification on both Map 7 and Table 9.

Maps 7A and 7B: There are several letter and number demarcations on these maps which presumably denote the exploratory boreholes that were drilled – but it is not explicitly stated what these letters/numbers represent on the maps. These boreholes should either be explained in the legend or removed altogether. Monitoring wells CR-06-01 and CR-06-02 were not depicted on Map 7B.

Map 28 needs to be updated to show any additional surface and groundwater monitoring locations added to the plan. Groundwater samples locations in Long Canyon and in Eagle Canyon that will be monitored as part of the water monitoring program should be updated on the map to show which of these samples have a water right attached to them.

Acid- and Toxic-Forming Materials and Underground Development Waste

The applicant refers to Section R645-301-624 to address the acid and toxic characteristics of their coal and mine development waste. The application states that a 12,000 cubic yard pile of

coal was buried on the property during prior mining activities that have occurred in the area. The applicant has indicated that this coal will be removed from the property prior to the inception of mining activities. Roof and floor materials will be removed and stored in designated in-mine rock storage areas. The applicant indicates that any emergency storage of this material on the surface will be placed in a temporary stockpile located within the disturbed area boundary and draining to the facility's sediment pond.

Findings:

The requirements for handling acid and toxic materials to prevent any negative effects to surface water or groundwater and overall water quality appears to be addressed in the plan and complies with the R645-731.300 Utah Coal Rules.

Transfer of Wells

There regulation is not addressed in the plan.

Findings:

Please address this regulation in accordance with R645-301-731.400.

In-Mine Water Disposal Options

The flow of mine drainage is anticipated to progress downdip toward the northeast and will be controlled with pumping while the mine is in operation so as to prevent any potential gravity discharge from the mine. The operators anticipate that there may be some flooding of the mine once mining activities cease where water will reach an equilibrium point. CR does not anticipate any post-cessation gravity discharge flow and plans to seal and backfill the mine portals. There are no plans to divert any surface water into underground mine workings.

Sediment Control Measures

The plan discusses under section R645-301-732 on page 7-110 how sediment pond sludge accumulation will be managed once it has collected in the pond. The plan indicates that in order to maintain adequate storage capacity, accumulated sediment will be disposed of within abandoned mine sections.

Findings:

CR proposes several alternatives under Section R645-731.500 in the event that a gravity discharge does occur. The first of these options states that discharge will be directed into remote

or abandoned underground workings. This practice is permissible under rule R645-731.513 provided that specific additional hydrology requirements are met as stated in the regulation. The applicant should add language as per the regulation making it clear that this provision regarding the diversion of underground from workings to abandoned workings is understood and update this section as wells as the section on page 7-102 of their plan accordingly.

Sludge materials that end up in the sediment pond are combinations of underground development waste and non-coal waste as defined in the regulations under R645-100-200 and R645-301-528.331, -542.741 and -747.100. Non-coal wastes include, but are not limited to, grease, lubricants, paints, flammable liquids, garbage, abandoned mining machinery, lumber and other combustible materials generated during mining and reclamation activities. Non-coal waste streams are not an accepted form of waste allowed to be discharged into underground mine workings as per R645-731.511 & 512. It is recommended that this sentence be removed and language associated with the applicant's intent to haul sediment pond sludge offsite be inserted.

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

Regulatory Reference: 30 CFR Sec. 784.14; R645-301-730.

Analysis:

Several deficiencies and additional data are needed to be resolved prior to the Division issuing a CHIA for the site.

RECOMMENDATIONS:

Several deficiencies were identified in the hydrology section of the new permit application. These deficiencies need to be addressed. Approval is not recommended at this time.

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